

## **Section I (Amendments to the Claims)**

Please amend claims 2 and 32, and cancel claim 31, as set out in the following listing of the claims 1-35 of the application.

1. (Original) A rumen bacterial mutant which a lactate dehydrogenase-encoding gene (*ldhA*) and a pyruvate formate-lyase-encoding gene (*pfl*) have been disrupted, and has the property of producing succinic acid at high concentration while producing little or no other organic acids in anaerobic conditions.
2. (Currently amended) A rumen bacterial mutant in which a lactate dehydrogenase-encoding gene (*ldhA*), a pyruvate formate-lyase-encoding gene (*pfl*), a phosphotransacetylase-encoding gene (*pta*) and a acetate kinase-encoding gene (*ackA*) have been disrupted, and which has the property of producing succinic acid ~~at high concentration while producing little or no other organic acids~~ in anaerobic conditions , wherein the rumen bacteria are selected from the group consisting of the genus *Mannheimia*, the genus *Actinobacillus* and the genus *Anaerobiospirillum*.
3. (Withdrawn) A rumen bacterial mutant which a lactate dehydrogenase-encoding gene (*ldhA*), a pyruvate formate-lyase-encoding gene (*pfl*), and a phosphoenolpyruvate carboxylase-encoding gene (*ppc*) have been disrupted, and has the property of producing succinic acid at high concentration while producing little or no other organic acids in anaerobic conditions.
4. (Withdrawn) The rumen bacterial mutant according to claim 1, wherein the rumen bacteria are selected from the group consisting of genus *Mannheimia*, genus *Actinobacillus* and genus *Anaerobiospirillum*.
5. (Withdrawn) The rumen bacterial mutant according to claim 1, wherein the rumen bacteria are homo-fermentative bacteria that produce only succinic acid while producing little or no other organic acids.
6. (Withdrawn) The rumen bacterial mutant according to claim 1, wherein the rumen bacterial mutant is *Mannheimia* sp. LPK.
7. (Withdrawn) The rumen bacterial mutant according to claim 6, wherein said *Mannheimia* sp. LPK is KCTC 10558BP.

8. (Original) The rumen bacterial mutant according to claim 2, wherein the rumen bacterial mutant is *Mannheimia* sp. LPK7.
9. (Original) The rumen bacterial mutant according to claim 8, wherein said *Mannheimia* sp. LPK7 is KCTC 10626BP.
10. (Withdrawn) The rumen bacterial mutant according to claim 3, wherein the rumen bacterial mutant is *Mannheimia* sp. LPK4.
11. (Withdrawn) A method for producing rumen bacterial mutant that has the property of producing succinic acid at high concentration while producing little or no other organic acids in anaerobic conditions, the method comprising disrupting a lactate dehydrogenase-encoding gene (*ldhA*) and a pyruvate formate-lyase-encoding gene (*pfl*) from rumen bacteria that are selected from the group consisting of genus *Mannheimia*, genus *Actinobacillus* and genus *Anaerobiospirillum*.
12. (Withdrawn) A method for producing rumen bacterial mutant that has the property of producing succinic acid at high concentration while producing little or no other organic acids in anaerobic conditions, the method comprising additionally disrupting a phosphotransacetylase-encoding gene (*pta*) and an acetate kinase-encoding gene (*ackA*) from rumen bacteria that are selected from the group consisting of genus *Mannheimia*, genus *Actinobacillus* and genus *Anaerobiospirillum*, and a lactate dehydrogenase-encoding gene (*ldhA*) and a pyruvate formate-lyase-encoding gene (*pfl*) have been disrupted.
13. (Withdrawn) A method for producing rumen bacterial mutant that has the property of producing succinic acid at high concentration while producing little or no other organic acids in anaerobic conditions, the method comprising additionally disrupting a phosphoenolpyruvate carboxylase-encoding gene (*ppc*) from rumen bacteria that are selected from the group consisting of genus *Mannheimia*, genus *Actinobacillus* and genus *Anaerobiospirillum*, and a lactate dehydrogenase-encoding gene (*ldhA*) and a pyruvate formate-lyase-encoding gene (*pfl*) have been disrupted.
14. (Withdrawn) The method for producing the rumen bacterial mutant according to claim 12, wherein the rumen bacterial mutant having disruptions of a lactate dehydrogenase-encoding gene

(*ldhA*) and a pyruvate formate-lyase-encoding gene (*pfl*) is *Mannheimia* sp. LPK (KCTC 10558BP).

15. (Withdrawn) The method for producing the rumen bacterial mutant according to claim 11, wherein the disruption of the *ldhA* and *pfl* genes is performed by homologous recombination.

16. (Withdrawn) The method for producing the rumen bacterial mutant according to claim 15, wherein the homologous recombination is performed using a genetic exchange vector containing a disrupted *ldhA* and a genetic exchange vector containing a disrupted *pfl*.

17. (Withdrawn) The method for producing the rumen bacterial mutant according to claim 16, wherein the genetic exchange vector containing a disrupted *ldhA* is pMLKO-sacB, and the genetic exchange vector containing a disrupted *pfl* is pMPKO-sacB.

18. (Withdrawn) The method for producing the rumen bacterial mutant according to claim 12, wherein the disruption of the *pta* and *ackA* genes is performed by homologous recombination.

19. (Withdrawn) The method for producing the rumen bacterial mutant according to claim 18, wherein the homologous recombination is performed using a genetic exchange vector containing a disrupted *pta* and *ackA*.

20. (Withdrawn) The method for producing the rumen bacterial mutant according to claim 19, wherein the genetic exchange vector containing a disrupted *pta* and *ackA* is pPTA-sacB.

21. (Withdrawn) The method for producing the rumen bacterial mutant according to claim 13, wherein the disruption of the *ppc* gene is performed by homologous recombination.

22. (Withdrawn) The method for producing the rumen bacterial mutant according to claim 21, wherein the homologous recombination is performed using a genetic exchange vector containing a disrupted *ppc*.

23. (Withdrawn) The method for producing the rumen bacterial mutant according to claim 22, wherein the genetic exchange vector containing a disrupted *ppc* is pPPC-sacB.

24. (Withdrawn) A genetic exchange vector pMLKO-sacB containing a disrupted *ldhA*.

25. (Withdrawn) A genetic exchange vector pMPKO-sacB containing a disrupted *pfl*.

26. (Withdrawn) A genetic exchange pPTA-sacB containing a disrupted *pta* and *ackA*.

27. (Withdrawn) A genetic exchange vector pPPC-sacB containing a disrupted *ppc*.

28. (Withdrawn) A method for producing succinic acid, the method comprising the steps of: culturing a rumen bacterial mutant in anaerobic condition; and recovering succinic acid from the culture broth,

wherein the rumen bacterial mutant has the property of producing succinic acid at high concentration while producing little or no other organic acids in anaerobic conditions, and comprises a mutant selected from the group consisting of:

(I) a rumen bacterial mutant in which a lactate dehydrogenase-encoding gene (*ldhA*) and a pyruvate formate-lyase-encoding gene (*pfl*) have been disrupted;

(II) a rumen bacterial mutant in which a lactate dehydrogenase-encoding gene (*ldhA*), a pyruvate formate-lyase-encoding gene (*pfl*), a phosphotransacetylase-encoding gene (*pta*) and an acetate kinase-encoding gene (*ackA*) have been disrupted; and

(III) a rumen bacterial mutant in which a lactate dehydrogenase-encoding gene (*ldhA*), a pyruvate formate-lyase-encoding gene (*pfl*), and a phosphoenolpyruvate carboxylase-encoding gene (*ppc*) have been disrupted.

29. (Withdrawn) The method for producing succinic acid according to claim 28, wherein the culturing step is homo-fermentation which produces succinic acid at high concentration while producing little or no other organic acids.

30. (Withdrawn) The method for producing succinic acid according to claim 28, wherein the rumen bacterial mutant is *Mannheimia* sp. LPK, LPK7 or LPK 4.

31. (Cancelled)

32. (Currently amended) The rumen bacterial mutant according to claim 2, wherein the rumen bacteria are homo-fermentative bacteria that produce ~~only~~ succinic acid ~~while producing little or no other organic acids~~.

33. (Withdrawn) The rumen bacterial mutant according to claim 3, wherein the rumen bacteria are selected from the group consisting of genus *Mannheimia*, genus *Actinobacillus* and genus *Anaerobiospirillum*.

34. (Withdrawn) The rumen bacterial mutant according to claim 3, wherein the rumen bacteria are homo-fermentative bacteria that produce only succinic acid while producing little or no other organic acids.

35. (Withdrawn) The method for producing the rumen bacterial mutant according to claim 13, wherein the rumen bacterial mutant having disruptions of a lactate dehydrogenase-encoding gene (*ldhA*) and a pyruvate formate-lyase-encoding gene (*pfl*) is *Mannheimia* sp. LPK (KCTC 10558BP).